REMARKS

Claims 8, 15 and 27 have been cancelled and new claims 32-41 have been added so that claims 1-7, 9-14, 16-26 and 28-41 are now in the application. Claims 1, 2, 5, 7, 21, 22, 24 and 31 were rejected under 35 USC 102(e) as being anticipated by Seigler. Claim 1 is distinguished over Seigler by reciting:

"the read head and the stabilizer being separate structures."

This structure is shown in Fig. 6 of Applicants' drawings wherein the read head 104 and the stabilizer 150 are separate structures wherein the read head 104 is exemplified by a sensor 132 which is located between first and second shield layers 138 and 140 and the stabilizer 150 is exemplified by first and second elongated probes 152 and 154 which are interconnected by a bridge 156. The stabilizer is separate from the read head so as to avoid sensor non-linearity, sensor stability, amplitude thermal decay and electron migration. This is discussed in Applicants' specification, page 4, lines 1-19, wherein it is stated:

> A constant bias field has been proposed for maintaining the underlayer in a single domain state. In one proposal a bias field is introduced into the soft underlayer at a remote location from the read head during rotation of the magnetic disk. Unfortunately, by the time the underlayer portion reaches the read head the underlayer portion may have returned to a multiple domain state. *Another approach is to employ components of the read head for stabilizing the soft underlayer. This approach will pose reliability issues such as sensor non-linearity, sensor stability, amplitude thermal decay and electron migration.*
>
> **SUMMARY OF THE INVENTION**
>
> *The present invention provides a perpendicular recording and read head assembly with a stand-alone stabilizer, which is separate from a read head portion of the assembly, for stabilizing a portion of the soft underlayer directly below a portion of the recorded layer which is being read by the read head.* Simultaneously, with the read head reading a recorded portion of the top recorded layer the stabilizer, which is separate from and magnetically non-coupled to the read head, introduces a field into a portion of the bottom underlayer, which is directly below the recorded portion, with sufficient strength to stabilize the portion of the bottom underlayer in a single domain state. The stabilizer may include first and second elongated probes and a bridge wherein the bridge interconnects the first and second probes. *The read head is located between the first and second probes.* (emphasis added)

In support of the rejection the Examiner states in part:

> ". . . . . and the read head and the stabilizer being separate structures (as depicted in FIG. 3, "34" and "46")."

The Applicants disagree with the Examiner that the read head and the stabilizer of Seigler are separate structures. The Examiner refers to Fig. 3 of Seigler and apparently denotes reference numeral 34 as being the read head and reference numeral 46 as being the stabilizer. It should be noted that the stabilizer 46 is also the sensor of the read head 34. This is made clear from paragraph 0024 of Seigler which states:

> "Referring to FIG. 3, there is illustrated a partial schematic isometric view of the read head 34. *Specifically, the read head 34 includes a read sensor 46 positioned adjacent to or in contact with a magnetic shield 48.* The magnetic shield 48 may also serve as an electrical lead for passing a current I through the read sensor 46. An additional magnetic shield/lead may be positioned on an opposing side of the read sensor 46, but is not shown in FIG. 3 for simplicity." (emphasis added)

The double function of component 46 in Fig. 3 is further explained by Seigler in paragraph 0029 wherein it is stated:

> "The read sensor 46 advantageously generates a magnetic field, such as the magnetic field H illustrated in FIG. 3, which reduces noise from the soft magnetic underlayer 40 during operation of the read head 34. *Specifically, the magnetic field H generated by the read sensor 46 as a result of the current I that passes therethrough magnetically biases the soft underlayer 40, by holding or biasing the magnetic domains of the soft underlayer 40 in a desired, uniform direction.* Preferably, the magnetic domains of the soft underlayer 40 are biased substantially in a radial crosstrack direction." (emphasis added)

Accordingly, the sensor 46 of Applicants' read head 34 not only serves as a read sensor but also serves as a stabilizer. Accordingly, the read head 34, which includes the sensor 46, is not a separate structure from Seigler's stabilizer and the hereinabove recitation in claim 1, which recites the read head and the stabilizer as being separate structures, clearly distinguishes Applicants' claim 1 over Seigler.

Claim 2 is distinguished over Seigler by reciting:

". . . wherein the stabilizer includes:
first and second elongated probes and a bridge with the bridge interconnecting the first and second probes; and
the read head being located between the first and second probes."

Applicants' probes are shown at 152 and 154 in Fig. 6 with the read head 104 located therebetween. In regard to claim 2 the Examiner states:

> "As to Claim 2, Seigler et al. further discloses a data storage apparatus as claimed in base claim 1 wherein the stabilizer includes: a first and second elongated probes (FIG. 2, "36 and 32", page 2, ¶0022) and a bridge with the bridge interconnecting the first and second probes (FIG. 2, "35", page 2, ¶0022); and the read head being located between the first and second probes (as depicted in FIG. 2, "34", page 2, ¶0022)."

In the rejection of claim 1 the Examiner refers to component 46 in Fig. 3 as being Seigler's stabilizer. Component 46 is in fact Seigler's stabilizer as discussed hereinabove. If component 46 in Fig. 3 is Seigler's stabilizer, then Seigler's stabilizer cannot be the first and second probes 36 and 32 as asserted by the Examiner. The Applicants are not aware of the function of the probes 36 and 32. The only reference to these components is in paragraph 0022 of Seigler which states:

> " . . . . The recording head 22 also includes a read head 34 positioned between a reader pole 36 and the opposing pole 32. . . . ."

First it should be noted that the components 36 and 32 cannot be employed as a stabilizer because component 46 in Fig. 3 is a stabilizer and there is no teaching of how the probes 36 and 32 would be energized. Further, it is not understood how components 36 and 32 can support the read function of the read head 34. The sensor 46 of Seigler's read head 34 is a typical CPP sensor wherein a magnetic moment of a free layer (not shown) is rotated upwardly or downwardly relative to a fixed moment of a pinned layer (not shown) wherein the up and down movements of the magnetic moment of the free layer are caused by positive and negative bit incursions from the moving magnetic medium 16 in Fig. 3. These relative rotations change the resistances of the sensor 46 so that the sense current I correspondingly changes and causes potential changes which

are processed as playback signals by a processing circuit. The probes 36 and 32 play no part in this reading function.

Claims 5 and 7, which are dependent upon claim 1, are considered to be patentable over Seigler for the same reasons as given in support for claim 1. Claim 7, which has been amended to be dependent upon claim 3, is further distinguished over Seigler because of limitations in claim 3 which are discussed in more detail hereinbelow. Claims 21, 22, 24 and 31, which are method claims, are considered to be patentable over Seigler for the same reasons as given for their corresponding article claims.

Claims 3 and 23 were rejected under 35 USC 103(a) as being unpatentable over Seigler in view of Hu. Claim 3, which is dependent upon claim 1, is considered to be patentable over these references for the same reasons as given in support for claim 1. Claim 3 is further distinguished over these references by reciting:

> "the first probe being recessed from the head surface plane and the second probe being coextensive with the head surface plane."

This structure is shown in Applicants' Fig. 6 wherein the first probe 152 is recessed from the head surface plane 126 and the second probe 154 is coextensive with the head surface plane. In support of the rejection of claim 3 the Examiner states:

> "However, Hu et al teaches the read head having a head surface which defines a head surface plane; the first probe being closer to the read head than the second probe; a probe being recessed from the head surface plane and the second probe being coextensive with the head surface plane (on col. 6, lines 35-45)."

The Examiner refers to column 6, lines 35-45 of Hu, which state:

> "The layer S2/P1, write gap, insulation layer 11, write coil, insulation layers 12 and 13, and the second pole piece P2 are all recessed by the depression provided by the first shield layer S1 in the insulation stack region lowering the height of the second pole piece above the write gap plane so as to enhance planarization of the second pole tip PT2. This significantly reduces the aspect ratio of the resist during fabrication of the pole tip PT2, enabling construction of the pole tip at the ABS with a thin layer of resist, in the order of 4 μm as seen by the thickness of the resist layer 40 at the ABS in FIG. 5. . . . "

This structure is shown in Fig. 5 of Hu wherein the S2/P1 layer is recessed downwardly or otherwise laterally with respect to the ABS. All of the components S1, S2/P1 and P2 form a portion of the ABS and none of these components is recessed therefrom. Accordingly, claim 3 is clearly distinguished over these references. Claim 23 is considered to be patentable over the references for the same reasons as given in support for claim 3.

Claim 4 was rejected as being unpatentable over Seigler in view of Hu and further in view of Santini. Claim 4, which is dependent upon claim 3, is considered to be patentable over these references for the same reasons as given in support for claim 3. Claim 4 is further distinguished over the references by reciting:

> ". . . wherein the first probe increases in magnetic material volume as it extends toward the head surface."

This structure is shown in Applicants' Fig. 6 wherein the volume of magnetic material of the probe 152 increases as it extends toward the head surface 126. In support of the rejection of claim 4 the Examiner states:

> "However, Santini et al discloses a probe increases in magnetic material volume as it extends toward the head surface (page 4-5, ¶0056, lines 12-17). . "

Lines 12-17 of paragraph 0056 of Santini state:

> " . . . . Slanted ion milling is then implemented at a preferred angle from 5° to 15° to a normal to the major plane of the hard mask layer 146 while the wafer is rotated which causes the probe 128 to have slanted side walls 150 and 152 which progressively decrease in width from a top surface 154 to a bottom surface 156 of the probe. . . ."

This structure is depicted in Fig. 22C of Santini wherein the probe 128 decreases in material as it extends toward a base component therebelow. It should be noted, however, that the probe 128, as shown in Fig. 6, does not decrease in volume as it extends toward the ABS. In contrast, the probe 128, as shown in Fig. 22C, decreases in magnetic material as it extends in a plane which is parallel to the ABS in Fig. 6. Accordingly, the Santini reference does not provide a teaching wherein Applicants' first probe 152 increases in magnetic material volume as it extends toward the head surface 126.

Claims 6 and 25 were rejected under 35 USC 103(a) as being unpatentable over Seigler in view of Dimitrov. Claim 6, which is dependent upon claim 1, is considered to be patentable over these references for the same reasons as given in support for claim 1. Claim 25, which is dependent upon claim 21, is considered to be patentable over these references for the same reasons as given in support for claim 21.

Claim 9 was rejected as being unpatentable over Seigler in view of Hu. Claim 9 is considered to be patentable over these references for the same reasons as given in support for claim 3.

Claims 10 and 11 were rejected as being unpatentable over Seigler in view of Hu and further in view of Santini. Claims 10 and 11 are considered to be patentable over these references for the same reasons as given in support for claim 4.

Claims 12 and 13 were rejected as being unpatentable over Seigler in view of Hu and Santini and further in view of Dimitrov. Claim 12, which is dependent upon claim 11, is considered to be patentable over these references for the same reasons as given in support for claim 11. Claim 13, which is dependent upon claim 12, is considered to be patentable over the references for the same reasons as given in support for claim 12.

Claims 14, 16, 26 and 28 were rejected as being unpatentable over Seigler in view of Hu. Claim 14 is distinguished over these references by reciting:

> "a write head; and
> in addition to the read head being located between the first and second probes,
> the write head also being located between the first and second probes."

This structure is shown in Applicants' Fig. 7 wherein the write head 102 is located between the first and second probes 204 and 206. In support of the rejection of claim 14, the Examiner states:

> "However, Hu et al. discloses a write head located between a first and second pole piece on (col. 6-line 61-col. 7, line 31 & FIG. 7). Therefore, it would have been obvious to one of ordinary skill in the art to have used a "piggyback head" as taught by Hu et al. in Seigler's data storage system, because it would provide Seigler et al.'s system with the advantage of reducing the effect of domain wall reorientation after high EMF write operations on the shield layers, and therefore promoting a constant bias point for the sensor (col. 6, lines 64-67 of Hu et al)."

The Applicants disagree with the Examiner that the write head of Hu is located between a first and second pole piece as shown in Fig. 7. The write head is the first and second pole pieces P1 and P2 and therefore cannot be located between itself. There is nothing in Fig. 7 of Santini, nor is there any teaching within his specification of Applicants' stabilizer 202 as shown in Fig. 7, nor is there any suggestion in any of the references that the write head comprising P1, a gap, insulation layers I1, I2, I3, coil C and the second pole piece P2 be located between a stabilizer. Claim 16, which is dependent upon claim 14, is further distinguished over the references for the same reasons as given in support for claim 3 hereinabove. Method claims 26 and 28 are considered to be patentable over the references for the same reasons as given in support for claims 14 and 16 respectively.

Claims 17, 18 and 29 were rejected as being unpatentable over Seigler in view of Hu and further in view of Santini. These claims are considered to be patentable over these references for the same reasons as given in support for claim 4. Claim 29, which is dependent upon claim 28, is considered to be patentable over the references for the same reasons as given in support for claim 28.

Claims 19, 20 and 30 were rejected as being unpatentable over Seigler in view of Hu and Santini and further in view of Applicants' admitted prior art and Dimitrov. These claims are considered to be patentable over these references for the same reasons as given in support for claim 1.

New claims 32-41 have been added. Claim 32 is distinguished over the references by reciting:

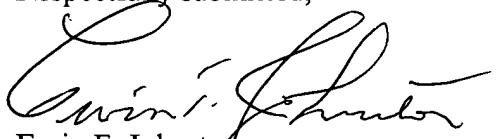
> "a read head for reading magnetic data from a recorded portion of a recording layer of a perpendicularly recorded magnetic medium;
>
> the read head including a read sensor and first and second shield layers with the sensor being located between the first and second shield layers;
>
> a stabilizer for magnetically stabilizing a portion of an underlayer of the magnetic medium directly below the recorded portion simultaneously while the read head is reading said magnetic data from the recorded portion; and
>
> the read sensor and the stabilizer being separate structures and magnetically decoupled with respect to one another."

Claim 32 specifically recites Applicants' sensor 132 in Fig. 6 as being a separate structure from the stabilizer 150 and that these structures are magnetically decoupled with respect to one another. As discussed hereinabove, Seigler's stabilizer 46 in Fig. 3 is also his read sensor so that they are one and the same component. Accordingly, new claim 32 is clearly distinguished over Seigler and the other references. Claims 33-41, which are dependent upon claim 32, are further distinguished over the references for the same reasons as given for their corresponding claims discussed hereinabove.

Please note that the undersigned has a new telephone number which is **808-661-1197**.

The Examiner is respectfully requested to contact the undersigned should there be any questions regarding this Amendment.

Respectfully submitted,



Ervin F. Johnston
Attorney for Applicant(s)
Reg. No. 20,190
Telephone: 808-661-1197
Fax: 808-661-9797